

WHAT IS CLAIMED IS:

1. A light source comprising:

an airtight container having disposed therein  
5 phosphor materials that emit light by ultraviolet rays  
which are radiated due to discharge;

a pair of internal electrodes disposed inside the  
airtight container;

a pair of external electrodes disposed outside the  
10 airtight container; and

a lamp controller that switches between an external  
electrode lighting mode resulting from the application  
of a voltage to the pair of external electrodes and an  
internal electrode lighting mode resulting from the  
15 application of a voltage to the pair of internal  
electrodes, wherein

the lamp controller controls, in the external  
electrode lighting mode, an electric potential  $V_{IN}$  with  
respect to the pair of internal electrodes and an  
20 electric potential  $V_H$  of the electrode of the higher  
electric potential of the pair of external electrodes to  
a condition where  $V_{IN} > V_H$ .

2. A light source comprising:

an airtight container having disposed therein phosphor materials that emit light by ultraviolet rays which are radiated due to discharge;

a pair of internal electrodes disposed inside the  
5 airtight container;

a pair of external electrodes disposed outside the airtight container; and

a lamp controller that switches between an external  
10 electrode lighting mode resulting from the application of a voltage to the pair of external electrodes and an internal electrode lighting mode resulting from the application of a voltage to the pair of internal electrodes, wherein  
the lamp controller controls, in the external electrode  
15 lighting mode, an electric potential  $V_{IN}$  with respect to the pair of internal electrodes and an electric potential  $V_H$  of the electrode of the higher electric potential of the pair of external electrodes to a condition where  $V_{IN}$  is substantially equal to  $V_H$ .

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3. The light source according to claim 1, wherein

the lamp controller fixes, in the external  
electrode lighting mode, the voltage of the pair of  
internal electrodes to a direct-current voltage value of  
25 a condition where the electric potential  $V_{IN}$  with respect

to the pair of internal electrodes and the electric potential  $V_H$  of the electrode of the higher electric potential of the pair of external electrodes are such that  $V_{IN} > V_H$  or  $V_{IN}$  is substantially equal to  $V_H$ .

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4. The light source according to claim 1, wherein a noble gas is filled inside the airtight container.

5. The light source according to claim 1, wherein  
10 a gas comprising mainly xenon gas is filled inside the airtight container.

6. The light source according to claim 1, wherein  
the light source emits visible light in the  
15 external electrode lighting mode and emits infrared light in the internal electrode lighting mode.

7. The light source according to claim 1, further comprising:

20 a direct-current high voltage supply that generates a predetermined direct-current voltage applied to the pair of internal electrodes under the control of the lamp controller.

25 8. The light source according to claim 6, wherein

the electric potential level  $V_{IN}$  is fixed at an electric potential level of the direct-current high voltage supply, in the external electrode lighting mode.

5        9. The light source according to claim 1, wherein the airtight container includes:

        a cylinder that transmits not only visible light but also infrared light; and

        a pair of caps that respectively seal so as to  
10 be airtight both end portions of the cylinder.

10. The light source according to claim 9, wherein an inner surface of the cylinder includes:

        a first portion that the phosphor materials are  
15 disposed as a single layer having an even thickness; and

        a second portion that the phosphor materials are not coated extending in a band along the axial direction of the cylinder.

20        11. The light source according to claim 10, wherein the cylinder further includes a reflective film that is disposed between the cylinder and the phosphor materials.

12. The light source according to claim 1, further comprising:

a switching unit that is disposed between the external electrodes and the internal electrodes; and

5 a control circuit for controlling the electric potential of the internal electrodes so that the electric potential matches an electric potential that is the same as the electric potential of the electrode whose electric potential is the higher of the external  
10 electrodes, in the external electrode lighting mode.

13. The light source according to claim 1, further comprising:

a rectifying unit for controlling the electric  
15 potential of the internal electrodes so that the electric potential matches an electric potential that is the same as the electric potential of the electrode whose electric potential is the higher of the external electrodes, in the external electrode lighting mode.

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14. The light source according to claim 1, further comprising:

an internal electrode-use feeder circuit for feeding the pair of internal electrodes;

an external electrode-use feeder circuit for feeding the pair of external electrodes; and

a direct-current power source, wherein:

the internal electrode-use feeder circuit and the  
5 external electrode-use feeder circuit respectively includes an inverter circuit for converting direct currents from the direct-current power source to alternating currents; and

a lighting order signal is supplied from the lamp  
10 controller to the respective inverter circuit.

15. An image reading device comprising:

a platen;

a light source that irradiates light onto a  
15 document image including:

an airtight container having disposed therein phosphor materials that emit light by ultraviolet rays which are radiated due to discharge;

a pair of internal electrodes disposed inside  
20 the airtight container; and

a pair of external electrodes disposed outside the airtight container,

a lamp controller that switches between an external electrode lighting mode resulting from the application  
25 of a voltage to the pair of external electrodes and an

internal electrode lighting mode resulting from the application of a voltage to the pair of internal electrodes; and

an image sensor, wherein:

5 a reading document placed on the platen;

a lamp controller is controls an electric potential  $V_{IN}$  with respect to the pair of internal electrodes and an electric potential  $V_H$  of the electrode of the higher electric potential of the pair of external electrodes to  
10 a condition where  $V_{IN} > V_H$  or  $V_{IN}$  is substantially equal to  $V_H$ , in the external electrode lighting mode; and

the reading document is illuminated by the light source and a light reflected from the reading document is imaged in the image sensors.

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16. The image reading device according to claim 15, wherein

the lamp controller fixes, in the external electrode lighting mode, the voltage of the pair of  
20 internal electrodes to a direct-current voltage value of a condition where the electric potential  $V_{IN}$  with respect to the pair of internal electrodes and the electric potential  $V_H$  of the electrode of the higher electric potential of the pair of external electrodes are such  
25 that  $V_{IN} > V_H$  or  $V_{IN}$  is substantially equal to  $V_H$ .

17. The image reading device according to claim 15,  
further comprising:

5 a filter switching unit that switches filter  
restricting a spectral band of imaging light to an  
imaging light path in light reflected from the document  
image, to match the switching between the external  
electrode lighting mode and the internal electrode  
lighting mode.

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18. The image reading device according to claim 15,  
wherein

the light source emits visible light in the  
external electrode lighting mode and emits infrared  
15 light in the internal electrode lighting mode.

19. The image reading device according to claim 15,  
further comprising:

20 a direct-current high voltage supply that generates  
a predetermined direct-current voltage applied to the  
pair of internal electrodes under the control of the  
lamp controller.

20. The image reading device according to claim 15,  
25 further comprising:



a scanning unit including an imaging lens and a scanning mirror; and

a scanning control unit for controlling a scanning reading position, scanning reading rate and scanning  
5 direction of the scanning unit, wherein

the light reflected from the reading document is guided to the imaging lens by the scanning mirror, and imaged in the image sensor.

10 21. The image reading device according to claim 15, further comprising:

a visible light transmitting and infrared cutting filter;

a visible light cutting and infrared light  
15 transmitting filter; and

a filter switching control unit for switching between the visible light transmitting and infrared cutting filter and the visible light cutting and infrared light transmitting filter, so that one of the  
20 two filters is inserted in the imaging light path.